

---

# Surface Water Drainage Study - FY2022

---

## Saint Paul, Alaska



### **City of Saint Paul**

P.O. Box 901, Saint Paul, AK, 99660

Phone: (907) 546-3113, Fax: (907) 546-3188

## Acknowledgments

This 2022 Surface Water Drainage Study is the result from the vision, commitment, and leadership of the Saint Paul community. EBSC Engineering prepared this document, with assistance and support from the City of Saint Paul.

Edward Hakala, Professional Civil  
Engineer, EBSC



Phillip A. Zavadil, City Manager  
City of Saint Paul



# Table of Contents

Executive Summary.....	2
Key Priorities (Based on FY2022 SWDS and Community Input) .....	2
Objectives.....	2
Introduction and Background.....	3
Purpose .....	3
Background.....	3
Goals and Objectives.....	3
Drainage Study Area .....	4
Location and Access.....	4
Climate.....	4
Soils and Topography .....	4
Land Use .....	4
Population .....	4
Safety and Access Issues .....	5
Safety Concerns .....	5
Access Issues .....	5
Existing Drainage Deficiencies .....	6
Proposed Drainage Improvements .....	7
High-Priority Projects (2022–2027) .....	7
Medium-Priority Projects (2027–2032).....	7
Low-Priority Projects (2032–2042).....	8
Implementation Plan.....	9
Planning Phase.....	9
Design Phase .....	9
Construction Phase .....	9
Permitting and Regulatory Requirements .....	9
Equipment and Materials.....	10
Equipment Needs.....	10
Material Needs .....	10
Gravel Sources .....	10
Potential Funding Sources .....	11
Community Involvement and Planning Summary .....	12
Conclusion.....	13
Appendices .....	14

## Executive Summary

The City of Saint Paul, Alaska, located on Saint Paul Island in the Pribilof Islands, faces significant challenges with surface water drainage due to its unique geographic, climatic, and geologic conditions. This Surface Water Drainage Study (SWDS) for FY2022, prepared in collaboration with EBSC Engineering, LLC, builds upon prior studies, community input from meetings held on July 14, 2021, and additional data gathered from available documents. The study aims to identify drainage deficiencies, prioritize improvement projects, and propose practical solutions to enhance public safety, access, and infrastructure resilience.

### Key Priorities (Based on FY2022 SWDS and Community Input)

- High Priority (2022–2027):
  - Gas Station Area: Address large puddles impacting safety and access.
  - King Street: Improve drainage along the critical Airport Access Road.
  - Harbor Area: Mitigate drainage issues affecting the small boat harbor.
- Medium Priority (2027–2032):
  - Bartlett Blvd
  - Alley Street
  - Rim Rock Drive
  - Sidetown Road
  - Tolstoi Road
- Low Priority (2032–2042):
  - Additional roads for housing and access roads, as funding allows.

### Objectives

- Document existing drainage deficiencies and community needs.
- Prioritize projects based on safety, access, and public inconvenience.
- Propose feasible engineering solutions, including schematic designs for high-priority areas.
- Identify funding sources and regulatory requirements for implementation.

This study integrates community priorities, site observations from July 2021, and environmental considerations to guide transportation and drainage improvements in Saint Paul.

# Introduction and Background

## Purpose

The FY2022 SWDS aims to address surface water drainage challenges in Saint Paul to improve public safety, ensure reliable access to essential services, and enhance transportation infrastructure. The study provides a roadmap for the City, state and federal agencies, and engineering consultants to implement practical and cost-effective solutions.

## Background

Saint Paul is a small, predominantly Alaskan Native community on Saint Paul Island, accessible only by air and sea. The island's maritime climate, characterized by frequent storms, high winds, and heavy fog, exacerbates drainage issues. The local geology—layered basaltic lava flows, sandy soils, and fractured bedrock—allows precipitation to percolate freely, resulting in minimal natural drainageways but persistent ponding in low-lying areas. Poor-quality road materials (silty sand) and inadequate drainage infrastructure contribute to rutted, muddy, and impassable roads, particularly during spring and autumn.

The FY2022 SWDS, community meetings, and prior planning efforts identified key drainage problem areas, including the Gas Station, King Street, and Harbor Area. These areas pose safety risks, hinder emergency access, and cause public inconvenience. This updated study refines those priorities and incorporates new insights to address ongoing challenges.

## Goals and Objectives

- Describe Deficiencies: Document existing drainage issues and their impacts.
- Prioritize Needs: Rank problem areas based on community input and safety concerns.
- Propose Solutions: Develop practical, cost-effective drainage improvements.
- Guide Implementation: Provide schematic designs and regulatory guidance for high-priority projects.

# Drainage Study Area

## Location and Access

Saint Paul is located on a narrow peninsula at the southern tip of Saint Paul Island, 240 miles north of the Aleutian Islands and 750 miles west of Anchorage. The community is served by a state-owned asphalt runway with regular flights and a small boat harbor with a 1200' breakwater. Cargo vessels deliver goods approximately six times a year.

## Climate

Saint Paul experiences a southwest maritime climate with:

- Mean temperatures: 19°F to 51°F.
- Frequent cyclonic storms, high winds, and heavy summer fog.
- Annual precipitation: Approximately 23–30 inches, with significant runoff during storms due to limited natural drainageways.

## Soils and Topography

- Geology: Layered basaltic lava flows and sandy soils dominate, with fractured bedrock allowing rapid percolation of precipitation.
- Topography: The island spans 27,000 acres with sandy lowlands (up to 120 feet elevation) and active dunes in the northeast. Few incised drainageways exist, and wetlands occur at the base of uplands.
- Soils: Sandy material mixed with volcanic pyroclastics; organic-rich soils in wet areas. A shallow water table exists near Big Lake and Telegraph Hill.

## Land Use

- Residential: Predominant land use, with limited commercial and institutional areas.
- Traditional-Use Areas: The entire island and surrounding waters are used for subsistence fishing, hunting, and cultural activities.
- Right-of-Way (ROW): Ownership details are incomplete but critical for project implementation.

## Population

Saint Paul's population, primarily Alaskan Native (Unangan), is small and difficult to forecast due to economic and environmental factors. Infrastructure planning must account for potential growth to support housing and transportation needs.

# Safety and Access Issues

## Safety Concerns

Poor drainage leads to significant safety hazards, including:

- Gas Station Area: Large puddles create slippery surfaces, posing risks to pedestrians and vehicles.
- King Street (Airport Access Road): Flooding and rutting hinder access to the airport, a critical transportation hub.
- Harbor Area: Poor drainage affects the small boat harbor, impacting fishing operations and emergency access.

## Access Issues

- Gas Station: Puddles restrict access to fuel services, critical for community operations.
- King Street: Drainage deficiencies limit reliable airport access, affecting emergency services and supply deliveries.
- Harbor Area: Flooding impacts the halibut fishing fleet and cargo offloading.

## Existing Drainage Deficiencies

Based on the July 2021 site visit by Luke Mattson, P.E., and community input, the following deficiencies were identified:

- **Gas Station (Route 0009.030):**
  - Large puddles form due to inadequate drainage channels and poor road surface materials.
  - Impacts: Public safety (slippery surfaces), access to fuel services, and potential environmental contamination.
- **King Street (Route 0010.010):**
  - Flooding and rutting on the Airport Access Road due to insufficient crowning and roadside ditches.
  - Impacts: Hinders emergency access and travel to the airport.
- **Harbor Area (Route 6005.010):**
  - Poor drainage near the small boat harbor leads to ponding, affecting fishing operations and dock access.
  - Impacts: Limits economic activities and emergency response capabilities.
- **Other Areas (Medium/Low Priority):**
  - Bartlett Blvd, Alley Street, Rim Rock Drive, Sidetown Road, and Tolstoi Road experience rutting, ponding, and poor compaction due to silty sand materials and inadequate drainage infrastructure.

### Roadway Conditions

- **Material Quality:** Roads are constructed with 1.5–2.5 feet of silty sand, leading to poor compaction and structural instability.
- **Maintenance Challenges:** Saturated roads become rutted and impassable during spring break-up and autumn rains.
- **Main Street:** A pioneer trail requiring reconstruction as a permanent road.
- **Community Boat Landings:** Lack of roadway access to Kuskokwim River landings.

# Proposed Drainage Improvements

## High-Priority Projects (2022–2027)

- Gas Station Area (Route 0009.030):
  - Improvement: Extend the existing landfill road by 0.1 mile to a nearby creek to enhance drainage and trail access.
  - Design Elements:
    - Install culverts and construct roadside ditches to channel water to the creek.
    - Upgrade road surface with quality gravel aggregate to improve compaction and reduce ponding.
    - Implement a Storm Water Pollution Prevention Plan (SWPPP) to prevent contamination.
  - Estimated Cost: \$50,000–\$150,000 (planning and construction).
  - O&M Responsibility: City of Saint Paul.
- King Street (Route 0010.010):
  - Improvement: Add the 1.4-mile Airport Access Road to the transportation inventory and improve drainage.
  - Design Elements:
    - Regrade road with proper crowning or slope to direct water to new ditches.
    - Install culverts at key drainage points.
    - Cap road with quality aggregate to reduce rutting and dust.
  - Estimated Cost: \$200,000–\$500,000.
  - O&M Responsibility: State of Alaska (ADOT&PF).
- Harbor Area (Route 6005.010):
  - Improvement: Modify the alignment of the existing winter route to bypass a native allotment and improve drainage.
  - Design Elements:
    - Construct new drainage channels to direct water to the ocean or ponding areas.
    - Stabilize road surface with geotextile fabric and gravel.
    - Ensure compliance with environmental regulations (NEPA, EPA).
  - Estimated Cost: \$150,000–\$300,000.
  - O&M Responsibility: City of Saint Paul.

## Medium-Priority Projects (2027–2032)

- Bartlett Blvd, Alley Street, Rim Rock Drive, Sidetown Road, Tolstoi Road:

- Install roadside ditches and culverts.
- Upgrade road surfaces with quality aggregate Colbert and gravel.
- Regrade roads for proper drainage.
- Estimated Costs: \$100,000–\$250,000 per road (varies by length and scope).

### Low-Priority Projects (2032–2042)

- Additional Roads for Housing/Access Roads:
  - Develop new roads or improve existing ones as funding allows.
  - Focus on supporting future housing development and community connectivity.

# Implementation Plan

## Planning Phase

- Survey: Conduct topographic surveys with 2-ft contours to identify drainage paths.
- Conceptual Design: Develop horizontal alignment and road prism designs.
- Environmental Consultation: Prepare Environmental Assessments (EA) and secure permits.
- Preliminary Engineering Report: Assess alternatives, costs, and recommended designs.
- Site Control: Secure ROW/easements with landowners.
- Estimated Cost: \$25,000–\$100,000 per project.

## Design Phase

- Detailed Survey: 1-ft contour surveys and utility mapping.
- Milestone Reviews: Conduct reviews at 30%, 65%, 95%, and 100% design completion.
- Permitting:
  - ROW agreements.
  - Mining permits (Army Corps of Engineers).
  - SWPPP and EPA/ADEC construction approvals.
  - NEPA compliance.
- Cost Estimation: Update at each milestone.
- Specifications: Develop based on design standards.

## Construction Phase

- Bid Documents: Prepare plans, specifications, and bid forms.
- Pre-construction Plans: Safety, traffic control, SWPPP, and quality control plans.
- Construction Method: Bid to contractors or use local labor (force account).

## Permitting and Regulatory Requirements

- Comply with local, state (ADEC), and federal (EPA, NEPA) environmental standards.
- ADOT&PF standards apply for state-funded roads.
- Secure ROW and material agreements.

# Equipment and Materials

## Equipment Needs

- Current Equipment: Limited city-owned loaders, dump trucks, and excavators.
- Recommended Additions:
  - Grader for road maintenance.
  - Front-end loader and dump truck for material transport.
  - Excavator for ditch construction.

## Material Needs

- Quality Aggregate: Import gravel via barge to cap roads, reducing dust and mud.
- Geotextile Fabric: Stabilize road bases.
- Culverts: Facilitate drainage under roads.
- Dust Palliative: Control airborne dust on dry roads.

## Gravel Sources

- Local silty sand is inadequate; quality gravel must be barged or transported via ice road.
- Assess local borrow material quality and quantity during planning.

## Potential Funding Sources

- Federal:
  - Bureau of Indian Affairs (BIA) Tribal Shares.
  - Federal Highway Administration (FHA).
  - Federal Transit Administration.
  - Denali Commission.
  - Community Development Block Grants.
- Non-Federal:
  - State of Alaska General Fund.
  - Alaska Native Tribal Health Consortium.
  - ADOT&PF State Transportation Improvement Program.
  - DCCED Capital Matching Grants.

# Community Involvement and Planning Summary

## **Community Engagement**

- July 14, 2021 Meeting: Led by Luke Mattson, P.E., the meeting prioritized drainage issues (Gas Station, King Street, Harbor Area) and gathered public input on safety and access concerns.
- Ongoing Engagement: Future meetings to refine medium- and low-priority projects and confirm ROW agreements.

## **Public Input Outcomes**

- Emphasis on safety (e.g., eliminating puddles at Gas Station).
- Need for reliable access to airport and harbor.
- Desire for improved road materials and maintenance equipment.

## Conclusion

The FY2022 Surface Water Drainage Study for Saint Paul, Alaska, provides a comprehensive plan to address critical drainage deficiencies that impact safety, access, and community functionality. By prioritizing improvements at the Gas Station, King Street, and Harbor Area, and planning for future projects, the City aims to enhance infrastructure resilience and support its residents' quality of life. Collaboration with EBSC Engineering, community stakeholders, and funding agencies will be key to successful implementation.

For further information or to provide feedback, contact:

Phillip A. Zavadil, City Manager

City of Saint Paul

Phone: (907) 546-3113

Email: pazavadil@stpaulak.com

## Appendices

- Appendix A: Key Maps and Drawings
  - Overview maps of Saint Paul drainage areas.
  - Drainage Improvement Drawings
- Appendix B: Planning Summary and Public Involvement
  - Detailed notes from July 2021 community meeting.
  - Sign-in sheet
- Appendix B: Heavy Equipment Images
  - Photos of current and needed equipment.

# St. Paul Drainage Study





1 Alley Street



6 Gas Station



15 King Street



13 King Street



14 King Street



16 King Street



Bartlett BLVD



Bartlett BLVD



Bartlett BLVD



Bartlett BLVD



4 Bartlett BLVD



2 Bartlett BLVD



Bartlett BLVD



3 Bartlett BLVD



Bartlett BLVD



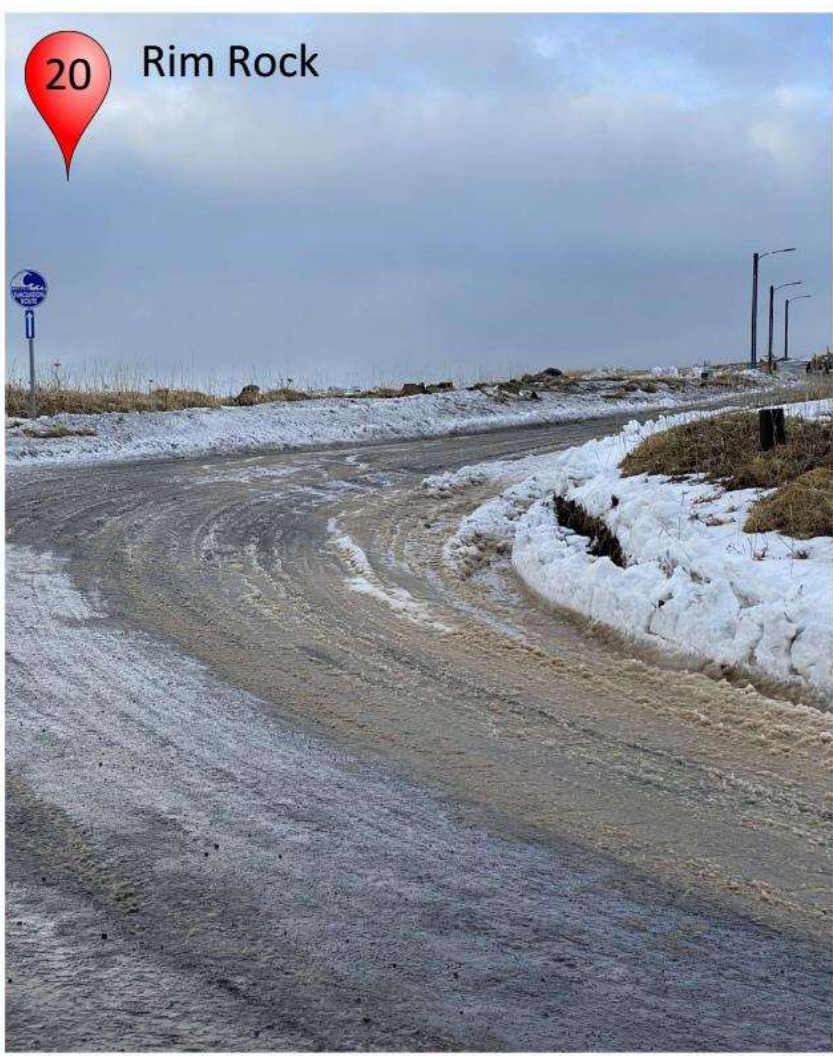
18

Rim Rock



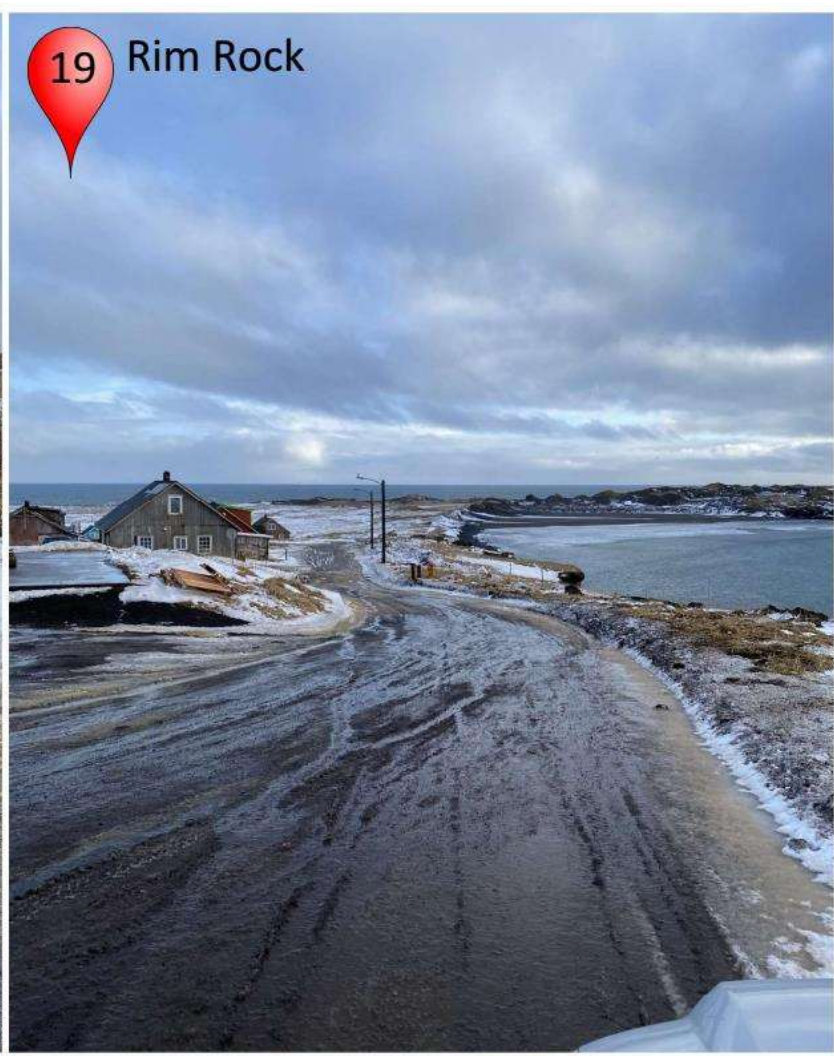
20

Rim Rock



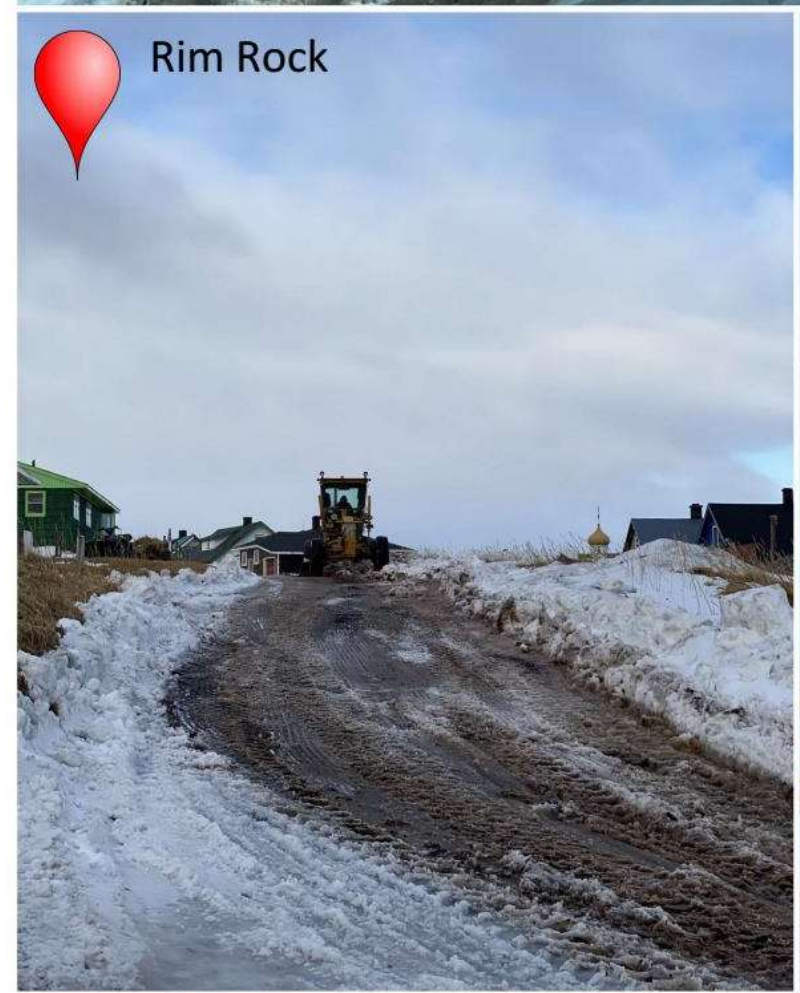
19

Rim Rock



Rim Rock

Rim Rock



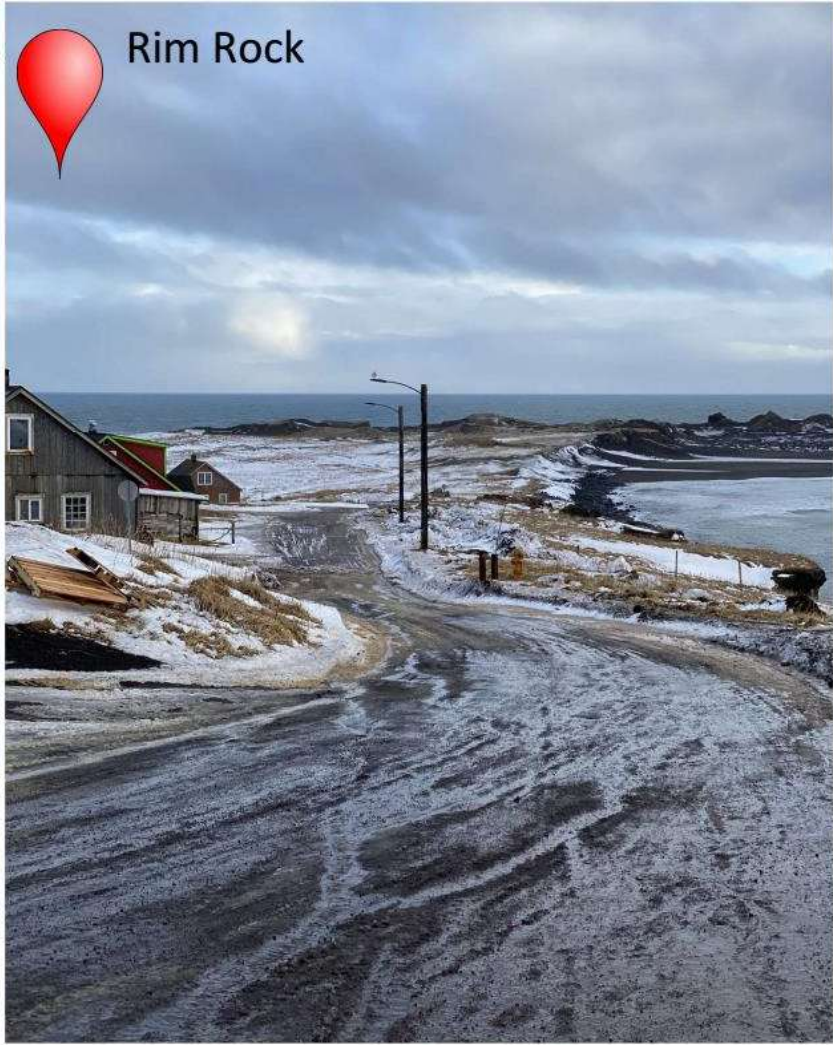
17

Rim Rock



Rim Rock

Rim Rock

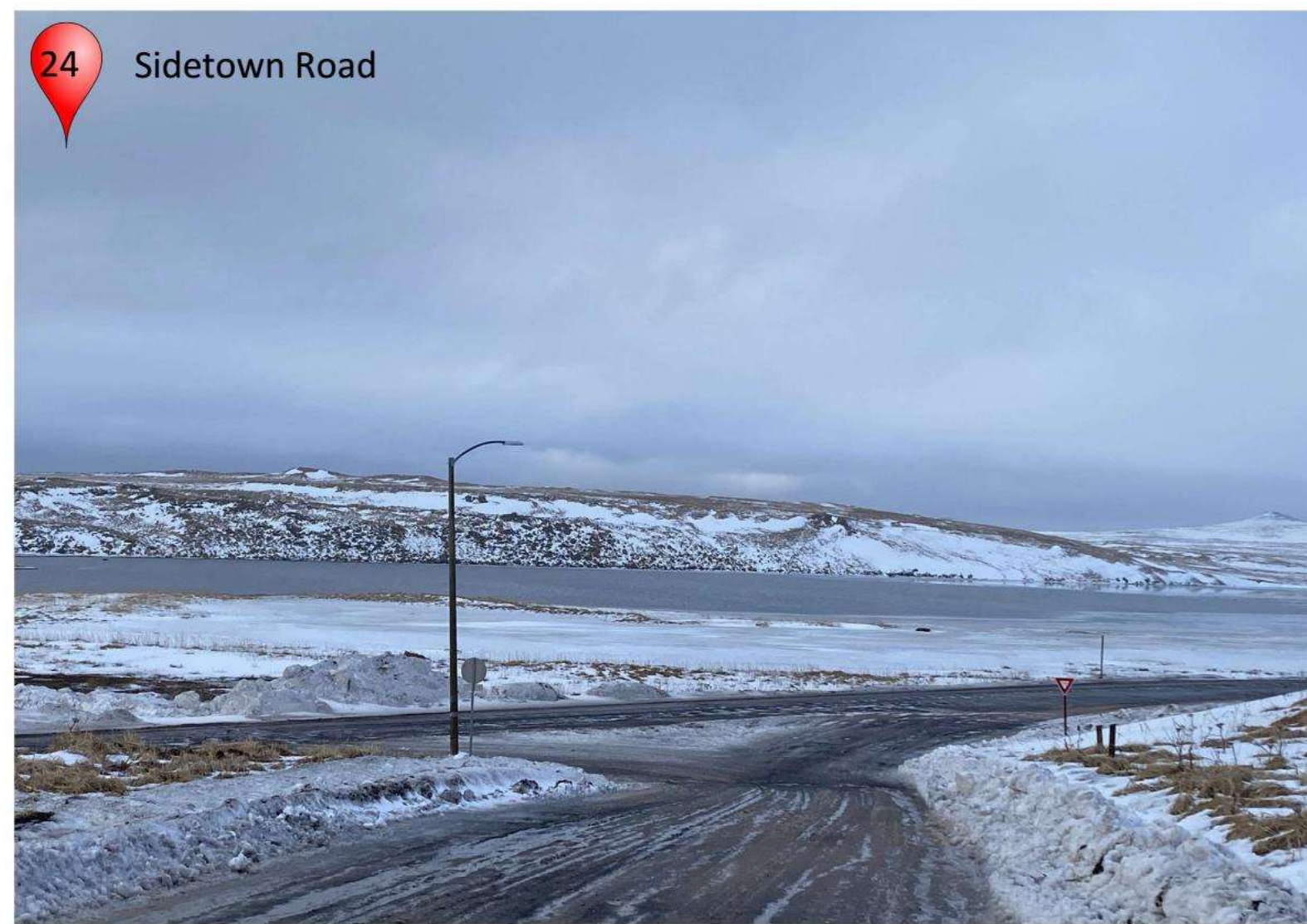


Rim Rock

Rim Rock



24 Sidetown Road



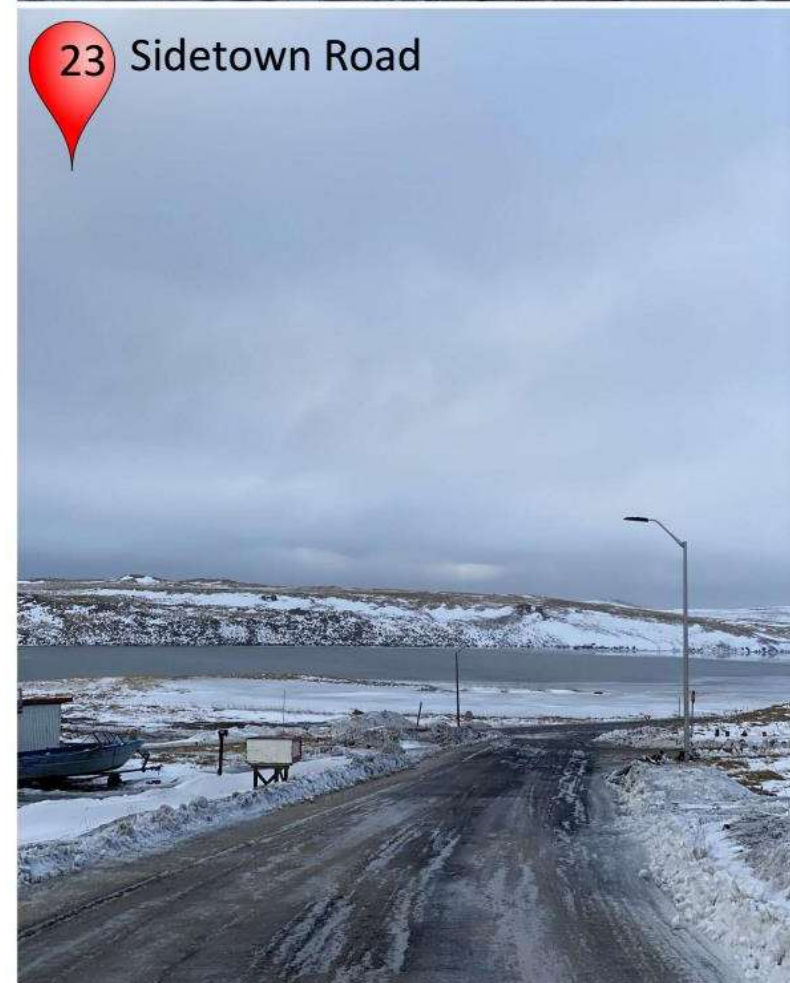
21 Sidetown Road



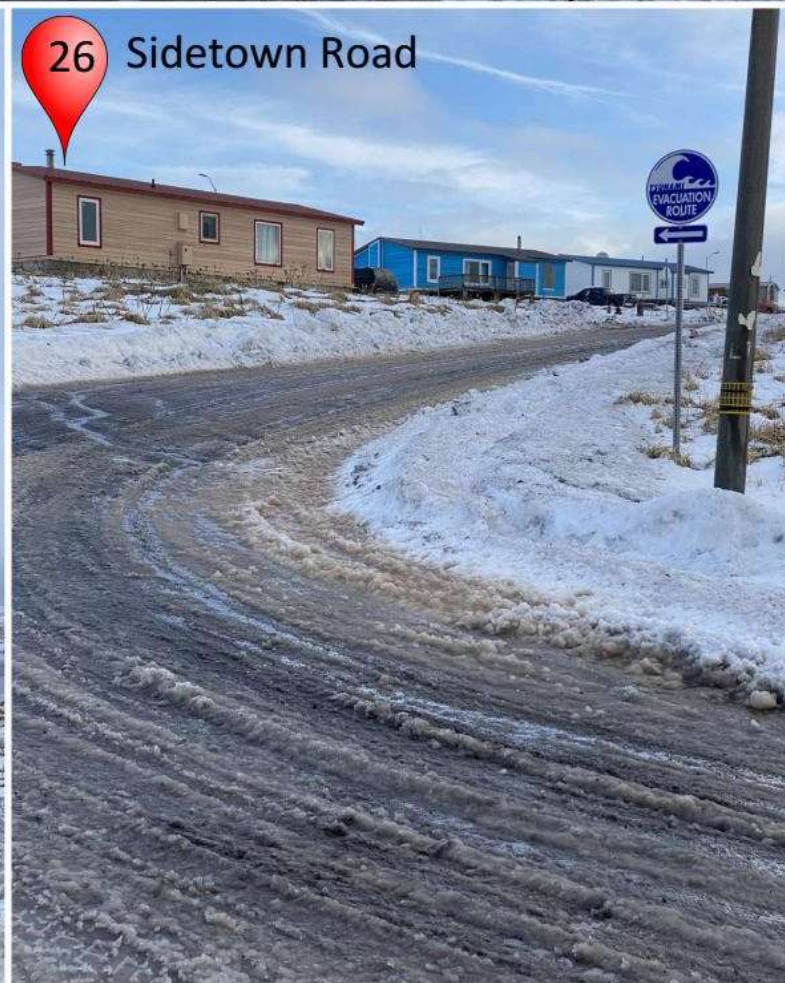
25 Sidetown Road



23 Sidetown Road



26 Sidetown Road



27 Sidetown Road



22 Sidetown Road





29



5



Tolstoi Blvd



Tolstoi Blvd



28

Tolstoi Blvd



Tolstoi Blvd

# Tolstoi Blvd

3 images, April 2021

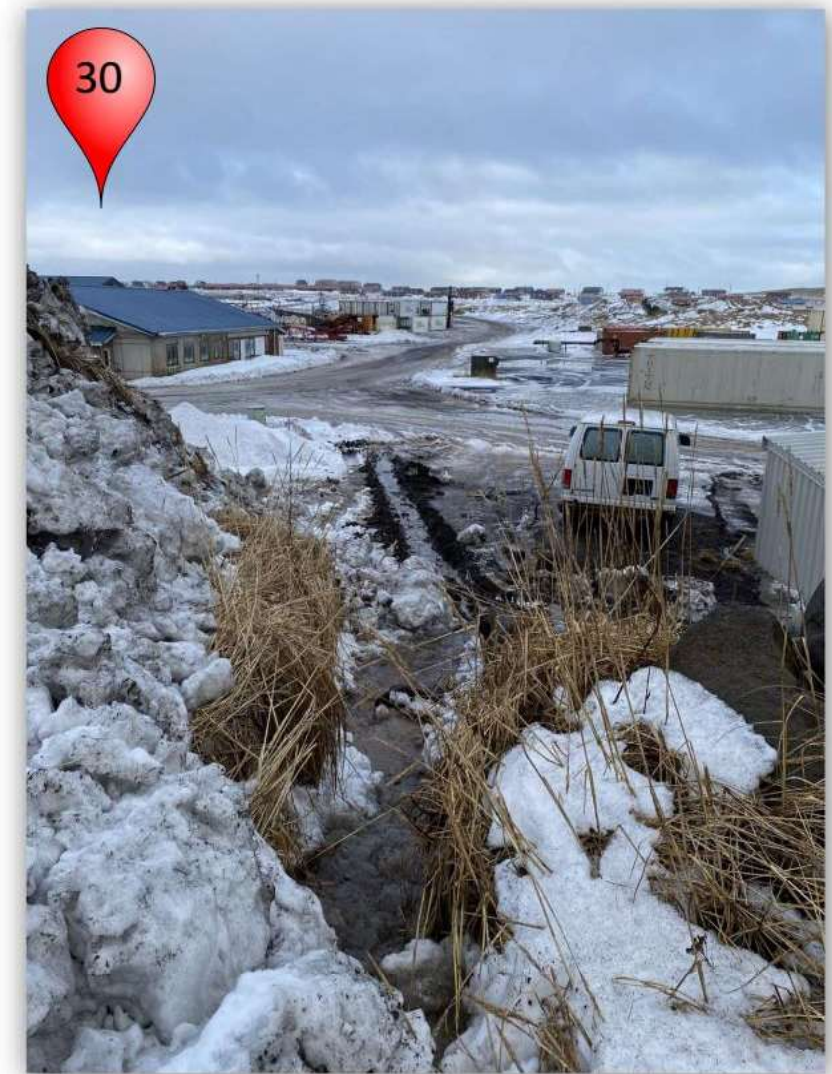
Tolstoi Blvd



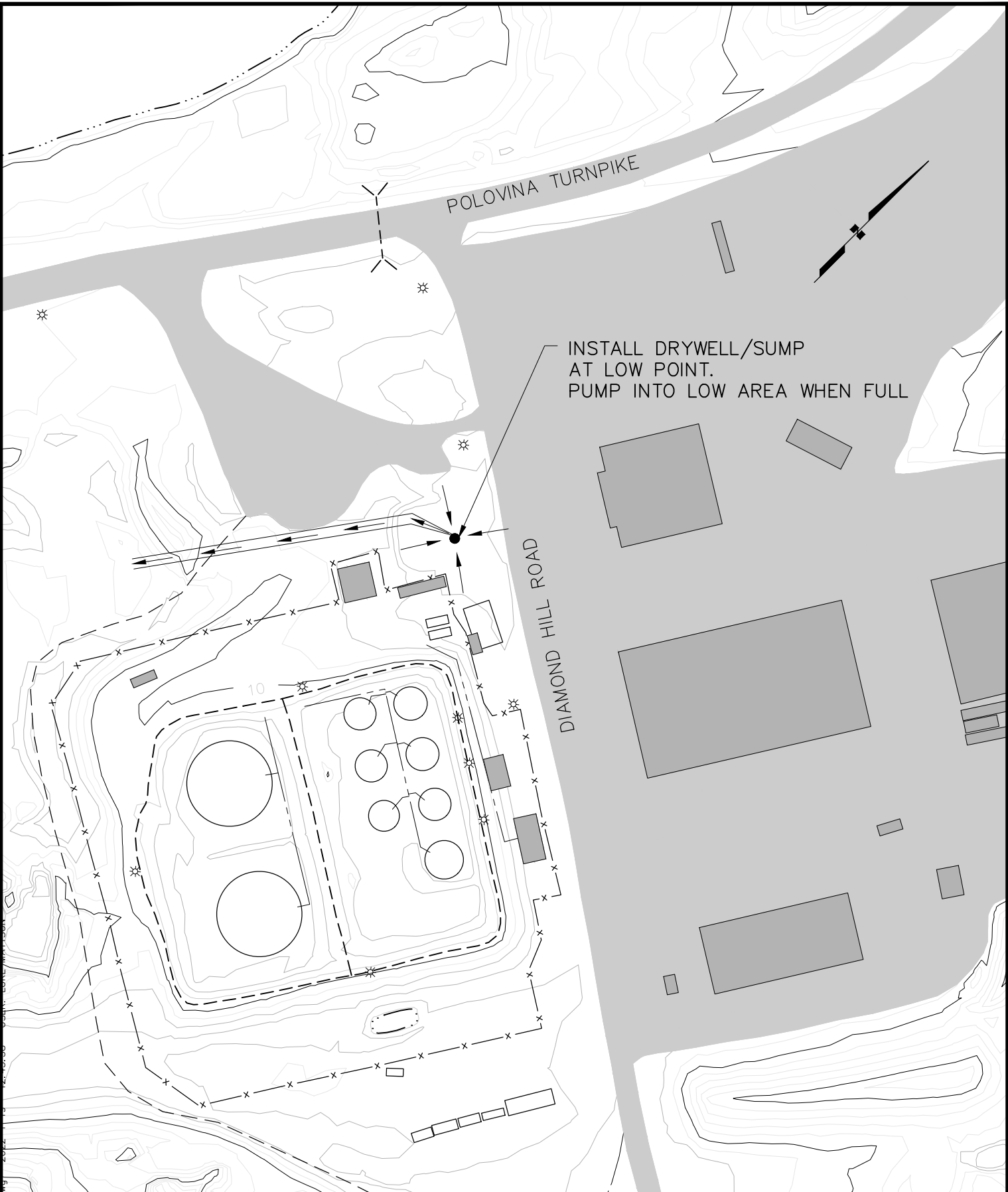
Tolstoi Blvd



Tolstoi Blvd



D:\EBSC Engineering LLC\EBSC Projects - Documents\2020 EBSC Projects\20.43 St. Paul Transportation Drainage Study\St. Paul Drainage



INSTALL DRYWELL/SUMP  
 AT LOW POINT.  
 PUMP INTO LOW AREA WHEN FULL



11301 OLIVE LN. ANCHORAGE AK, 99515  
 www.EBSCengineering.com

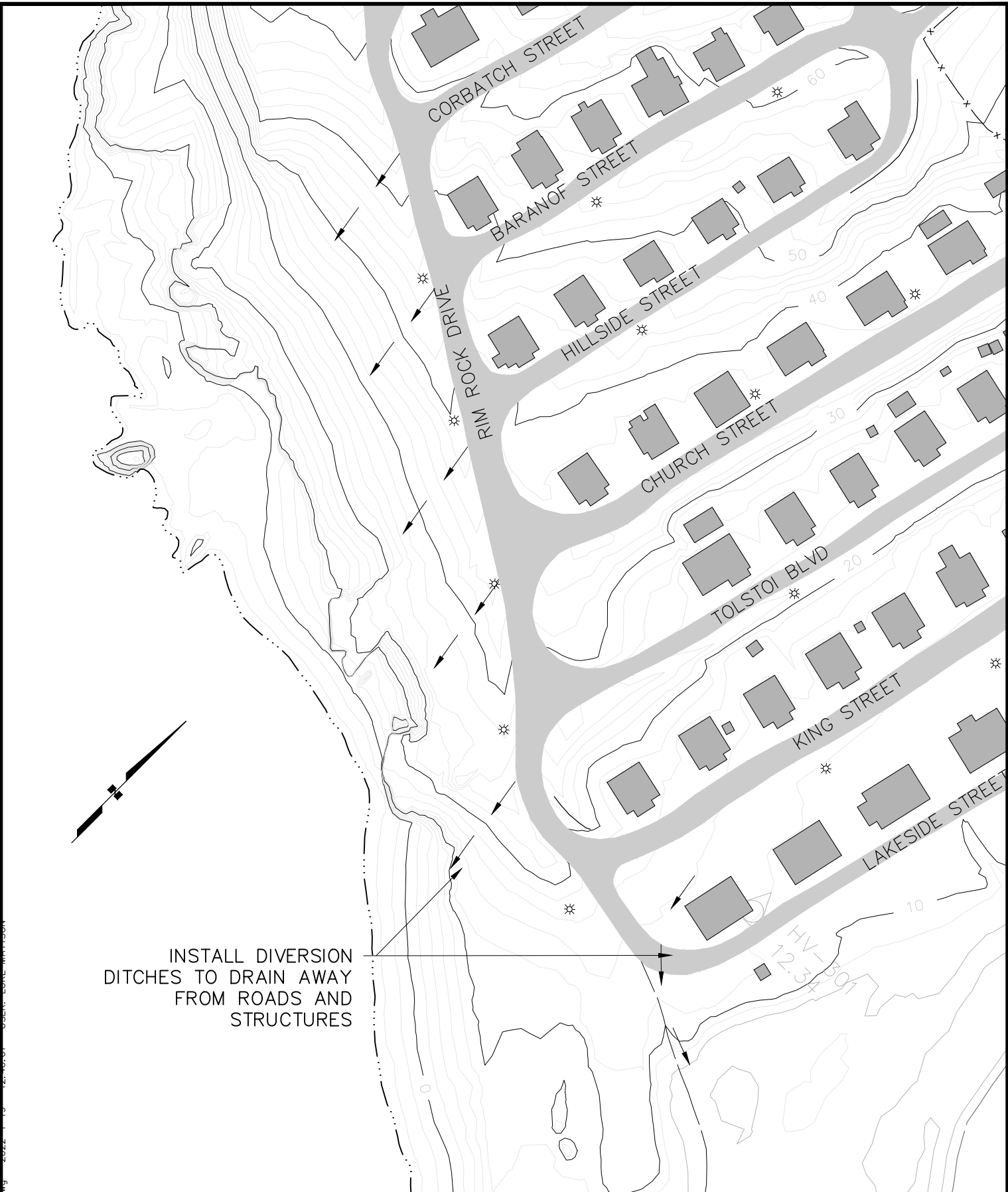
ST. PAUL DRAINAGE  
 ST. PAUL, ALASKA

**GAS STATION  
 DRAINAGE AREA**

SHEET NO.

**A1**

D:\EBSC Engineering LLC\EBSC Projects - Documents\2020 EBSC Projects\E20.43 St. Paul Transportation Drainage Study\St. Paul Drainage Area\2020-10-15\2020-10-15.dwg



INSTALL DIVERSION  
DITCHES TO DRAIN AWAY  
FROM ROADS AND  
STRUCTURES



11301 OLIVE LN. ANCHORAGE AK, 99515  
www.EBSCengineering.com

ST. PAUL DRAINAGE  
ST. PAUL, ALASKA

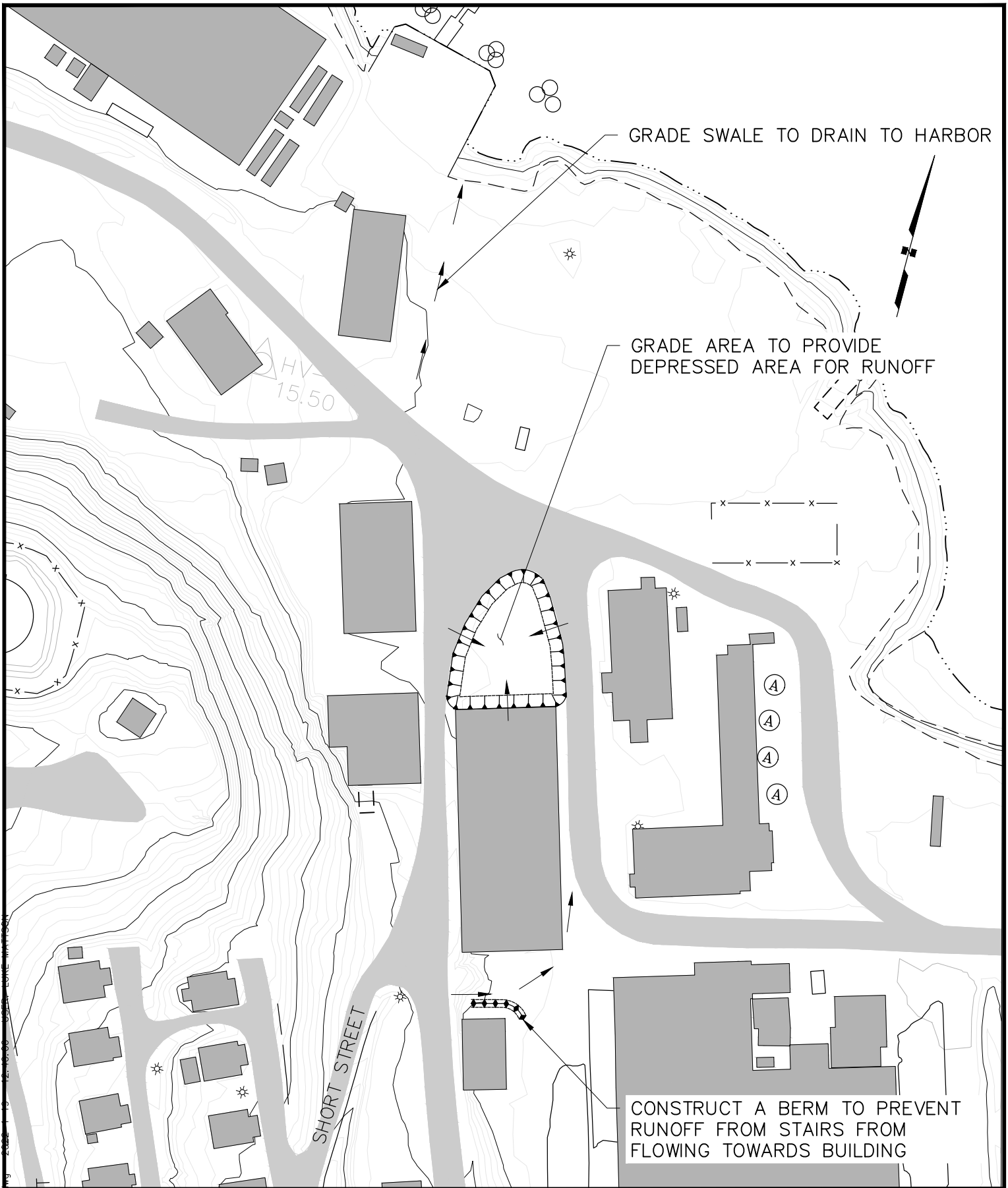
RIM ROCK DRIVE  
DRAINAGE AREA

SHEET NO.

**A2**

SCALE: AS SHOWN	DESIGN: LDM	CHECK: ELH	DRAWN: LDM	2022	2 OF 4
-----------------	-------------	------------	------------	------	--------

D:\EBSC Engineering LLC\EBSC Projects - Documents\2020 EBSC Projects\E20.43 St. Paul Transportation Drainage Study\St. Paul Drainage



11301 OLIVE LN. ANCHORAGE AK, 99515  
www.EBSCengineering.com

ST. PAUL DRAINAGE  
ST. PAUL, ALASKA

HARBOR  
DRAINAGE AREA

SHEET NO.

**A3**

SCALE: AS SHOWN

DESIGN: LDM

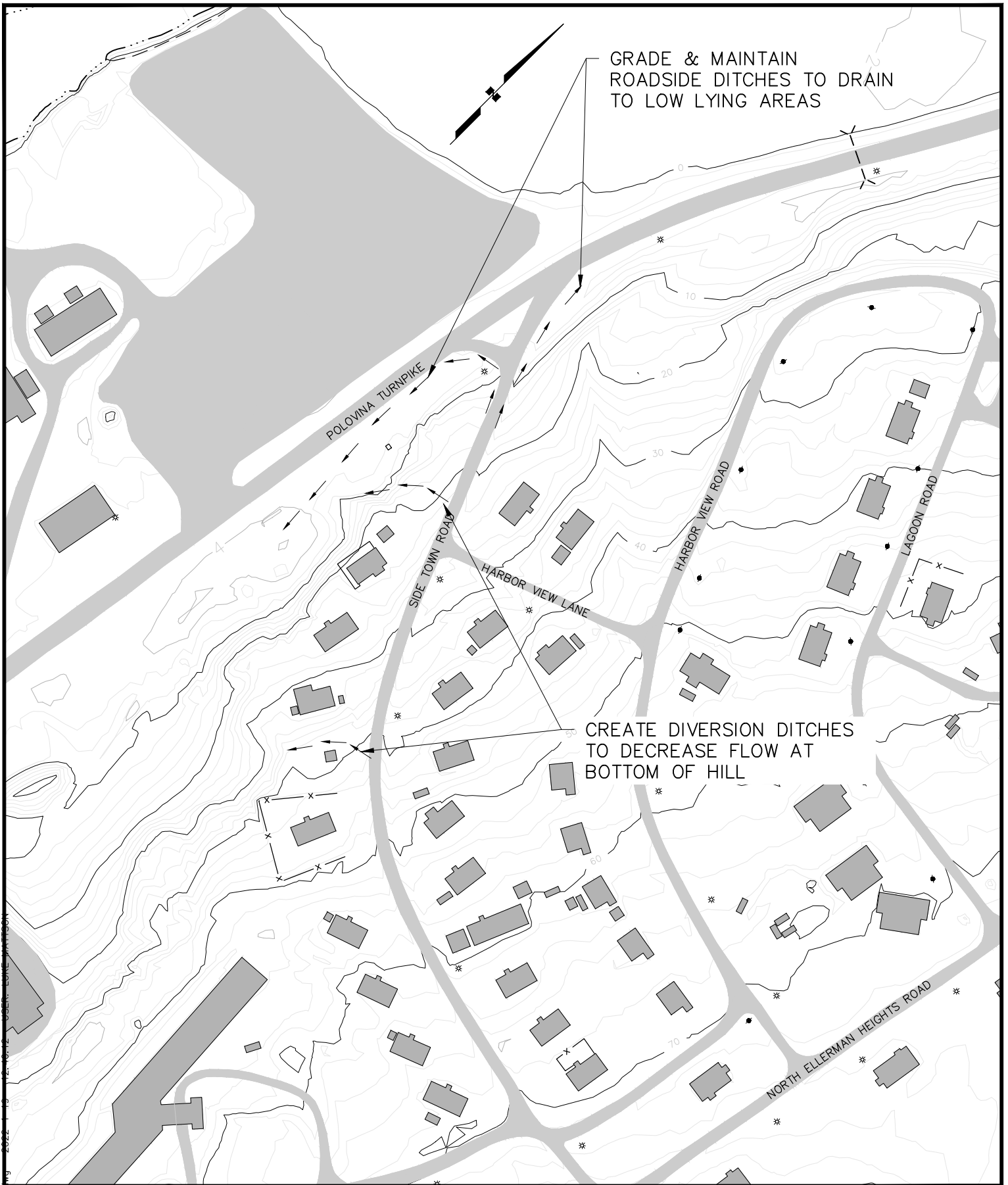
CHECK: ELH

DRAWN: LDM

2022

3 OF 4

D:\EBSC Engineering LLC\EBSC Projects - Documents\2020 EBSC Projects\E20.43 St. Paul Transportation Drainage Study\St. Paul Drainage



11301 OLIVE LN. ANCHORAGE AK, 99515  
[www.EBSCengineering.com](http://www.EBSCengineering.com)

ST. PAUL DRAINAGE  
 ST. PAUL, ALASKA

**SIDE TOWN ROAD  
 DRAINAGE AREA**

SHEET NO.

**A4**

SCALE: AS SHOWN

DESIGN: LDM

CHECK: ELH

DRAWN: LDM

2022

4 OF 4

# Surface Water Drainage Improvements Saint Paul Island, Alaska Public Meeting July 14, 2021



Sign-In

Name:	Name:



building sustainable communities

EBSC Engineering, LLC  
11301 Olive Lane  
Anchorage, AK 99515  
Phone: 907.222.1085  
Fax: 907.222.5210

## Memorandum

<b>Date:</b>	July 13, 2021	<b>Project:</b> E20.43
<b>To:</b>	Phillip A. Zavadil, City Manager City of Saint Paul P.O. Box 901 Saint Paul Island, Alaska 99660	
<b>From:</b>	Edward L. Hakala, P.E. Principal Civil Engineer	<b>Email:</b> eddie.hakala@ebsc.us <b>Web:</b> www.EBSCengineering.com
<b>Subject:</b>	Saint Paul Drainage Improvement Study – Site visit: July 13-15, 2021	

### Mr. Phillip Zavadil, City Manager

Thank you for the opportunity to visit Saint Paul Island and for hosting both a council meeting and public meeting. I am happy to see the level of interest and look forward to participation from the council and residents. Here is a summary of our purpose for traveling to Saint Paul:

- Luke Mattson, P.E., is the senior design engineer at EBSC Engineering and will personally observe the conditions of the previously identified areas where surface water drainage is a problem. These problem areas will be assessed for the following:
  - Public Safety – any problem area (drainage problems) that poses a safety to the public. These areas will be treated as a high priority need.
  - Public Nuisance – any problem area that cause traffic to be re-routed and potentially hinder access to emergency services.
  - Public Inconvenience – any problem area that prevents traffic from safely traveling at design speeds due to water puddles or potholes.
- Council and Public Meeting:
  - Solicit input on drainage problems and potential safety issues
  - Prioritize areas of concern – TOP THREE
  - Discuss potential solutions for top three areas

----- FURTHERMORE -----

- Observation of the existing gravel sources will be made to assess the quality and quantity of material that will likely support future roadway/drainage improvements.
- Observation of the existing heavy equipment that is readily available to support excavation, transportation, placement, and compaction of aggregate.
- Discussion of current maintenance practices and needs/interests for additional heavy equipment.

---

----- DRAINAGE / ROADWAY ASSESSMENTS -----

The roads impacted by drainage issues will be assessed for the following:

- Clearly defined drainage channels and final locations where surface water drains – ocean, ponding areas, etc.
- Roadway elevation and surface grade (crowning or sloped to one side)
- Road side ditches and space to construct new/improved ditches
- Quality of surface course material (aggregate)
- Current maintenance practices

Please let me know if there are any comments/questions or additions to be made to this outline.

Again, thank you for the opportunity to support Saint Paul in this meaningful project.